

3M 820 Wet- Reflective Tape on SR-6 & I-215

Final Report

Experimental Feature X(02)12 – New Products

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June 2006

Abstract

Introduction

Pavement markings continue to be a developing field in transportation. The most challenging property of pavement marking is its ability to provide delineation during wet-night conditions. Although Utah is the second driest State in the Union, wet-night reflectivity can be a concern. UDOT's Traffic and Safety Division identified 2 such locations; US-6 near Soldier Summit and I-215 (300 East to 1300 East).

UDOT's Traffic and Safety Division along with the local maintenance division decided to install 3M's wet-reflective tape on these two locations. The section on US-6 was installed in August 2003 and the section on I-215 was installed in September 2003. UDOT's Research Division has been asked to monitor these sections for durability, retro-reflectivity, and wet-night retro-reflectivity. This study will last three years and interim reports will be written each fall and spring.

Background Information

This 8-mile stretch of US-6 is primarily a three-lane (two EB, one WB) highway (see Figure 1), however it constricts to a two-lane highway at the beginning and end of the section.



Figure 1-Typical Section of US-6 (Heading WB)

Interstate 215 is the belt route of Salt Lake City. At the test section location, the road is a six-lane divided interstate (see Figure 2).



Figure 2-Typical I-215 section

Table 1 gives the properties of each section of this Experimental Feature.

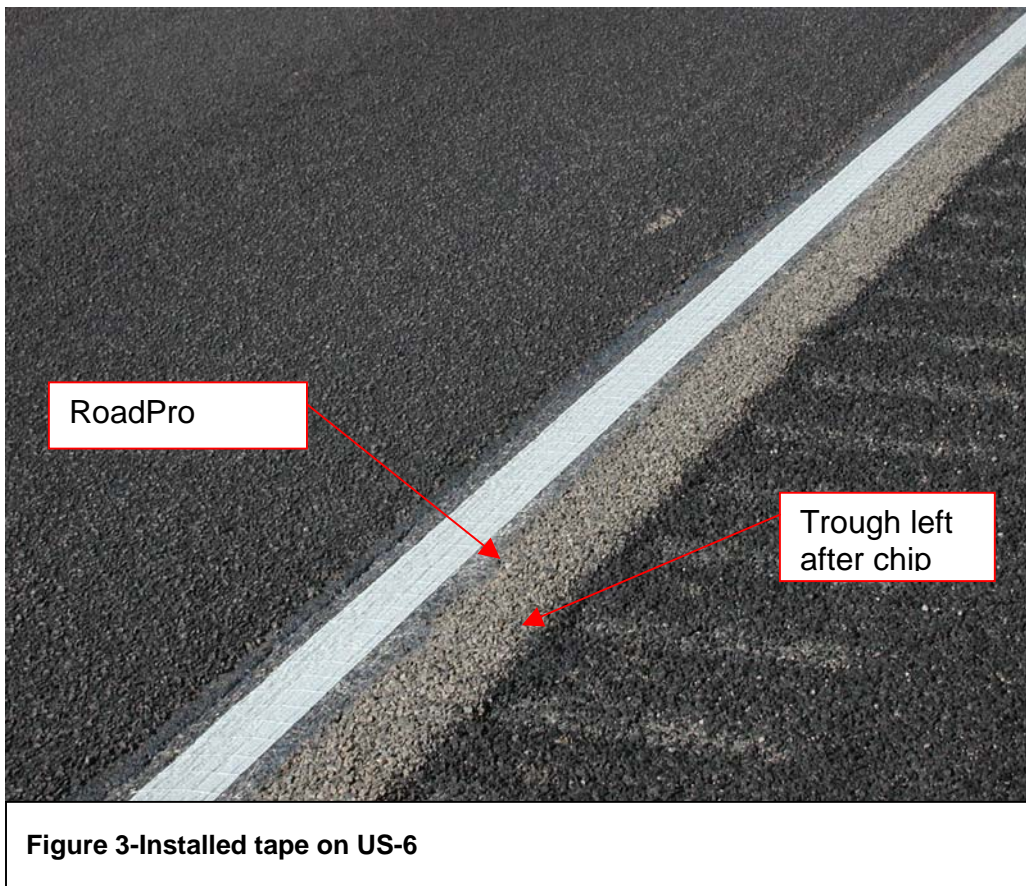
Table 1		
	US-6	I-215
AADT	6,855	116,251 - 58,000 Each Direction
Material	PG Asphalt	PCCP
Elevation	1,900m - 2,250 m	1,300 m

Construction Information

Both installations required the product to be placed below the profile of the road. For the US-6 project this was accomplished in two ways. First, a chip seal was

placed over the existing asphalt surface, but the oil sprayers were turned off over the tape location. This allowed the excess chips to be swept away and a trough was left where the tape was going to be placed. Then, a Roadpro asphalt grinder was used to increase the depth of the inlay and to make a more precise groove. The surface was then sprayed with the 3M primer, the paper backing removed, and the product placed. Compacting rollers were not used on this job; instead, a car wheel and a truck wheel were driven over the product to press it. Figure 3 shows the end product.

The SR-6 project included only the edgeline of the two-lane rural road. The I-215 project included both white edgeline, yellow edgeline, and skip lines.



Goal

The goal of this project was to determine the effectiveness of this tape.

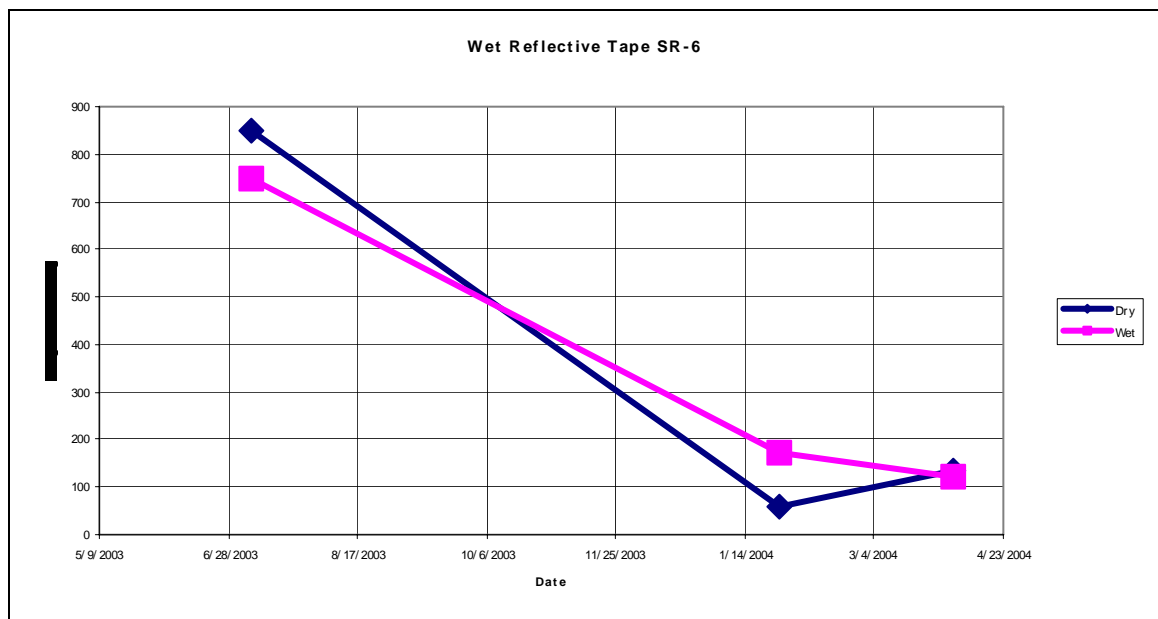
Objectives

The objectives are:

1. Evaluate the retro reflectivity over time ($\text{mcd/m}^2/\text{lx}$).
2. Evaluate the durability over time.

Results

1. The initial retro reflectivity was very good. However, there was a large standard deviation in the data. The data shows a dramatic decline in the RR over the first season. The wet-night retro reflectivity was measured using the LTL 2000 and showed good results.



The chart shows the dramatic decline. Interestingly, the values doubled or sometimes tripled if the RR was measured against the flow of traffic. This hasn't been explained, but may indicate the product is more sensitive to snow plow abrasion than other markings.

2. There was a major problem with the durability. In both locations there were major portions that came up. The total loss amounted to about 10% of the total project. The reason for the loss isn't yet known. Warranty work will be done to replace the failed tape.
3. Warranty work was performed by 3M and because the redo involved significant replacement at both sites the study was discontinued. Evaluating old and new is not practical and yields mixed results.

Conclusions

The tape lost its much of its RR after the first season. The product also suffered heavy loss in durability after the first season. However, subjective descriptions of the product during wet-night conditions were extremely positive indicating the product works under the conditions for which it is designed.

Recommendations

The product should be further studied to see if the durability and RR problems are resolved before larger sections are applied.

A new test site will be located and the product installed along with a control in 2005. This installation will be evaluated for three years for durability and retro-reflectivity.

A new and improved wet night tape was installed in the fall of 2005 on I-80 from MP 31 to MP 40 +/- . The tape was installed as a skip stripe on the inside skip of the east bound lanes. The new wet night tape has evolved to the raised profile similar to the tape we used universally except the raised portions are not offset. The retro-reflective readings taken in the fall of 2005 with the mobile reflect-o-meter were not as high as expected but the contact is the same as the tape we now use on our HMA and PCCP and is expected to have similar life.

Appendix



Figure 0-Failed tape on SR-6



Figure 0-Failed tape on SR-6



Figure 0-Failed tape on SR-6



Figure 0-90% typical tape on SR-6